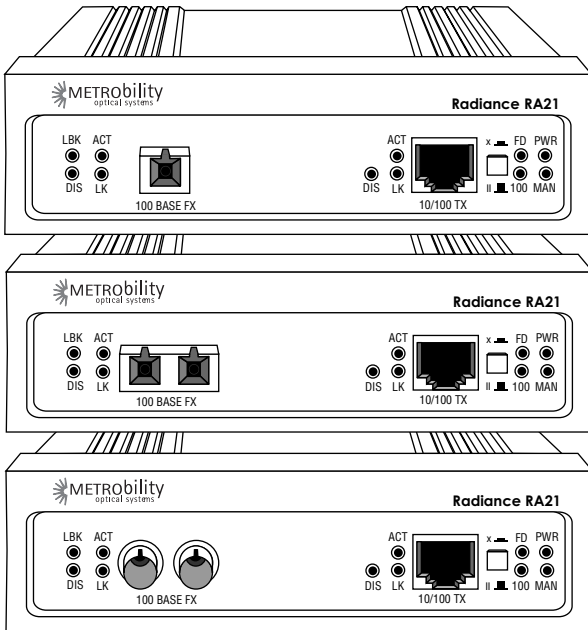# METRObility
optical systems

RADIANCE 10/100MBPS
ACCESS OPTICAL NETWORK UNIT

Installation & User Guide

Models: RA21-13 / RA21-14 / RA21-15 / RA21-16 /
RA21-17 / RA21-1J / RA21-1X / RA21-1Y

Radiance Access Optical Network Unit

10/100Mbps Copper to Fiber:
RA21-13 ____ 10/100 TX RJ-45 to FX multimode SC
RA21-14 ____ 10/100 TX RJ-45 to FX singlemode SC with diagnostics
RA21-15 ____ 10/100 TX RJ-45 to FX multimode ST
RA21-16 ____ 10/100 TX RJ-45 to FX singlemode ST with diagnostics
RA21-17 ____ 10/100 TX RJ-45 to FX singlemode SC (40km) with diagnostics
RA21-1J ____ 10/100 TX RJ-45 to FX singlemode SC (100km) with diagnostics
RA21-1X ____ 10/100 TX RJ-45 to FX singlemode 1550/1310nm bidirectional
wavelength division multiplexed (BWDM) SC
RA21-1Y ____ 10/100 TX RJ-45 to FX singlemode 1310/1550nm BWDM SC

Accessory:
2731-WM____ Wall mounting bracket

Table of Contents

Radiance 10/100Mbps Access Optical Network Unit Installation & User Guide

Overview

The Metrobility Radiance 10/100Mbps Access Optical Network Unit (ONU) offers the benefits of remote management while eliminating the expenses associated an additional chassis and management card at the remote site. The compact Access ONU is a complete standalone device designed for installation at the customer premise, with no additional equipment. It supports 10Mbps and 100Mbps circuits, as well as auto-negotiation, ensuring compatibility with any customer equipment. The Access ONU provides real time monitoring of line quality, remote loopback and other WAN management features that allow a network administrator in the central office to conduct preemptive trend analysis and to isolate faults. Because problems are addressed locally without having to send a technician to the customer site, the results are reduced maintenance costs, greater efficiency, and faster response to customer requests.

Designed to operate with the ONU, a Radiance Access Line Card installed in the central office is used to communicate, test and reconfigure the remote Access ONU, without reducing the available bandwidth to the customer. This is accomplished through Metrobility's innovative Radiance technology, which enables the Access Line Card and ONU to receive and transmit special management packets in an embedded side channel.

The Access Line Card and ONU continually exchange information in a master/slave relationship through their fiber link. The Access Line Card serves as the master, and the ONU as the slave. The master must reside in a chassis containing a Metrobility management card. The management card is accessible through local software control via an SNMP agent such as Metrobility's NetBeacon™, via HTTP with WebBeacon™, or via a serial port or telnet connection using the command line interface. The ONU can be located up to 100km away and be remotely controlled and accessed from the managed chassis.

Through NetBeacon, a network administrator in a central office can open a dialog with the Access ONU and reset its hardware switch settings, monitor its environmental parameters, or view port details and statistics. NetBeacon provides extensive real-time and historical graphs to display information such as the packet error rate and packet details. The administrator can also perform tests on the remote link, without any bandwidth reduction, and isolate problems to prevent downtime. This end-to-end visibility and testing of the network simplifies network management and increases reliability.

The Access ONU performs various operations set through hardware switches or remote management instructions. Among these functions are loopback and Far End Fault (FEF). Loopback enables a port to return its incoming data back to

the sender. FEF enables the Access Line Card in the central office to detect a break in the Access ONU's fiber port receiver. The combination of these operations, along with the unit's remote management feature, enable easy deployment of Ethernet services to customers.

The Radiance Access ONU provides the following key features:

• Compatibility with any 10Mbps or 100Mbps copper Ethernet device at the customer premise.

• Remote management through Metrobility's innovative Radiance technology which enables communication between the central office and customer site.

• Complete Remote Monitoring (RMON) Group 1 Ethernet Statistics support.

• Remote link testing that does not affect the customer's available bandwidth.

• Individual port enable/disable.

• Far End Fault to notify the central office of a link loss on the Access ONU's fiber port receiver.

• Auto-negotiation on the copper port.

• Half and full duplex support on the copper port.

• 10Mbps or 100Mbps support on the copper port.

• Link Loss Carry Forward (LLCF) and Link Loss Return (LLR) functionality to aid in troubleshooting.

• Integral singlemode fiber optic power monitors to measure the receive and transmit levels of the optical transceivers. (Models RA21-14, -16, -17 and -1J)

• Full signal restoration that allows for maximum segment length.

• Push-button MDI-II/MDI-X switch on the front panel to eliminate the need for crossover cables on the copper port.

• Optional wall mounting bracket.

• Full compliance with applicable portions of IEEE 802.3, 802.3u and 802.3x.

• Maximum transmission unit (MTU) size of 1535 bytes, which accommodates Q-over-Q (IEEE 802.1ad) VLAN tagging and MPLS labels.

Installation Guide

Follow the simple steps outlined in this section to install and start using the Radiance 10/100Mbps Access Optical Network Unit.

1 Unpack the Unit

Your order has been provided with the safest possible packaging, but shipping damage does occasionally occur. Inspect your order carefully. If you discover any shipping damage, notify your carrier and follow instructions for damage and claims. Save the original shipping carton if return or storage of the unit is necessary.

2 Set the Switches
MDI-II to MDI-X Switch (twisted-pair port only)

To eliminate the need for crossover cables, the Access Optical Network Unit has an MDI-II to MDI-X switch on its twisted-pair port. The switch is located on the front panel, to the right of the RJ-45 connector. Use this switch to configure the port for either a straight-through or crossover connection.

- The parallel symbol (II) indicates a straight-through or parallel connection. The switch is up. *(default)*

- The cross symbol (X) indicates a crossover connection. The switch is down.

Use the following table as a guide.

A device that is wired straight through needs one crossover connection:	
If the cable is	the MDI-II to MDI-X switch setting should be
straight through	**X**
crossover	**II**

A device that is wired crossover needs a parallel connection:	
If the cable is	the MDI-II to MDI-X switch setting should be
straight through	**II**
crossover	**X**

DIP Switches

A set of six DIP switches is located on the back of the unit. These switches allow you to select from several modes of operation and are clearly marked. Refer to the following table for the proper setting of the DIP switches.[*]

Switch Label	Position	Function
DUPLEX	ON (default)	Full duplex is enabled on the TX port, if AUTONEG is OFF.
	OFF	Half duplex is enabled on the TX port, if AUTONEG is OFF.
AUTONEG	ON (default)	TX port advertises 100Mbps full-duplex capabilities to its link partner.
	OFF	Auto-negotiation is disabled. Duplex and speed for the TX port are set through the DUPLEX and 100M switches.
100M	ON (default)	TX port speed is set to 100Mbps, if AUTONEG if OFF.
	OFF	TX port speed is set to 10Mbps, if AUTONEG is OFF.
FEF	ON (default)	Far End Fault is enabled on the FX port.
	OFF	Far End Fault is disabled on the FX port.
LLR	ON	Link Loss Return is enabled on the FX port.
	OFF (default)	Link Loss Return is disabled on the FX port.
LLCF	ON	Link Loss Carry Forward is enabled on the unit.
	OFF (default)	Link Loss Carry Forward is disabled on the unit.

Radiance Access Optical Network Unit

Default Settings
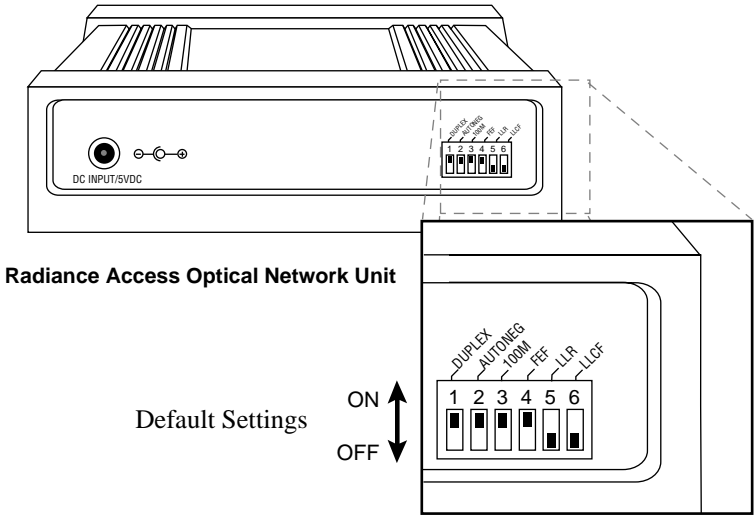
* DIP switches can also be managed remotely via console commands or through Metrobility's NetBeacon or WebBeacon management software. Refer to the *Command Line Interface Reference Guide*, *NetBeacon Element Management Software Installation & User Guide* or *WebBeacon Management Software Installation & User Guide* for software management information.

Radiance 10/100Mbps Access Optical Network Unit   **7**

Duplex

The DUPLEX switch sets the duplex mode on the copper port when auto-negotiation is disabled. The copper port operates at full duplex when DUPLEX is ON. It operates at half duplex when DUPLEX is OFF.

When auto-negotiation is enabled, the DUPLEX switch setting is ignored.

Auto-Negotiation

Auto-negotiation is supported only on the copper port. When switch AUTONEG is ON, the copper port advertises 100Mbps full-duplex capabilities to its link partner.

When auto-negotiation is disabled, the copper port's duplex is set through the DUPLEX switch, and its speed is set by the 100M switch.

Speed

Switch 100M determines the speed setting for the copper port when auto-negotiation is disabled. The copper port speed is set to 100Mbps when the 100M switch is ON, and 10Mbps when it is OFF.

The 100M switch setting is ignored when auto-negotiation is ON.

Far End Fault

Far End Fault (FEF) only applies to the fiber optic port. FEF enables a managed Radiance Access Line Card in a central office to detect a break in the Access ONU's fiber port receiver. If FEF is enabled on the Access ONU and its fiber port stops receiving link signals, an unsolicited alarm will be sent to its Access Line Card partner. No alarms will be issued if FEF is disabled.

Link Loss Return

Link Loss Return (LLR) is only applicable to the fiber port. When LLR is enabled, loss of the receive signal at the port disables its own transmitter from emitting link pulses. When LLR is disabled, the fiber port continually transmits an idle signal.

Refer to Link Loss Return for additional information.

Link Loss Carry Forward

Link Loss Carry Forward (LLCF) is provided as an aid in troubleshooting a remote connection. When LLCF is enabled, loss of the receive signal at the copper port prevents the fiber port from transmitting an idle signal onto the cable. Conversely, if the fiber port does not detect a receive signal, the copper port will not transmit an idle signal.

When LLCF is disabled, the unit continually transmits idle signals on both ports.

Warning: If LLCF is enabled on the Access ONU and there is no link on the unit's copper port, you will NOT be able to manage the ONU.

Refer to Link Loss Carry Forward for further details.

3 Connect to the Network

The Radiance Access Optical Network Unit offers the ease of plug-and-play installation. To connect to the network, simply insert the cables into the appropriate connectors. Once power is applied to the unit, correct connectivity can be verified via the link (LK) LEDs.

Network Connections

RA21-13	RJ-45 to FX multimode SC	_____	100m/2km
RA21-14	RJ-45 to FX singlemode SC	_____	100m/20km
RA21-15	RJ-45 to FX multimode ST	_____	100m/2km
RA21-16	RJ-45 to FX singlemode ST	_____	100m/20km
RA21-17	RJ-45 to FX singlemode SC	_____	100m/40km
RA21-1J	RJ-45 to FX singlemode SC	_____	100m/100km
RA21-1X	RJ-45 to FX singlemode BWDM SC	_____	100m/20km
RA21-1Y	RJ-45 to FX singlemode BWDM SC	_____	100m/20km
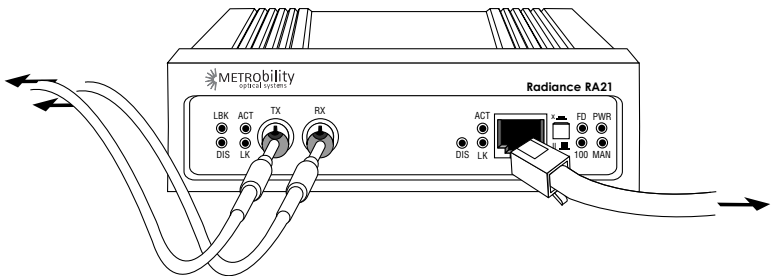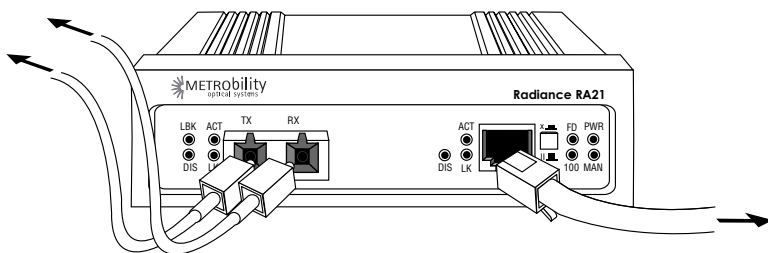
Twisted-Pair Interface

The copper port provides a shielded RJ-45 connector that supports a maximum segment length of 100 meters. Use only Category 5 cables.

Fiber Optic Interface

The unit's fiber receiver (RX) is to the right of the transmitter (TX). When making network connections, make sure that the fiber receiver on the Access ONU connects to the transmit port of the connected device, and that the receive port of the connected device connects to the Access ONU's fiber transmitter.

The fiber optic multimode interface supports a maximum segment length of 2km.

The singlemode (SM) connector supports a maximum segment length of 20km, 40km, or 100km, depending on the model.

To enable remote management, make sure the management (MAN) LED is ON after connecting the fiber cable to the Access ONU. If the MAN LED is not lit, reset the unit or the Access Line Card it is connected to by using software commands or a complete power cycle.

BWDM Interface

up to 20km

**Metrobility
R231-1X or RA21-1X**

**Metrobility
RA21-1Y or R231-1Y**
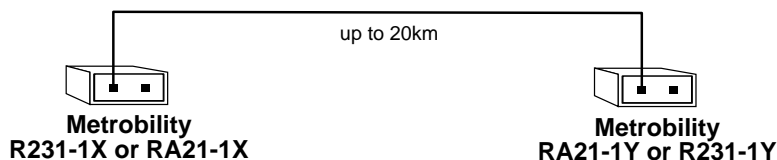
The bidirectional wavelength division multiplexed (BWDM) port provides one singlemode SC connector that supports a maximum segment length of 20km. BWDM units must always be used in comple-

mentary pairs. That is, a -1X model must always be connected to a -1Y. The -1X units are designed to transmit data at a wavelength of 1550nm and receive at 1310nm. Correspondingly, the -1Y units transmit data at 1310nm and receive at 1550nm.

4 Apply Power

Power is provided through the desktop power supply module. This power module is equipped with an S760 hollow-type plug for insertion into the DC jack located on the back of the unit and a standard IEC 320/C14 type AC power receptacle.

When making power connections, connect to the DC input jack located on the back of the Access ONU *__before__* making the AC connection to the outlet.

Upon receiving power, the Access ONU goes into normal operation mode and automatically provides the appropriate signal translation between connected network segments.
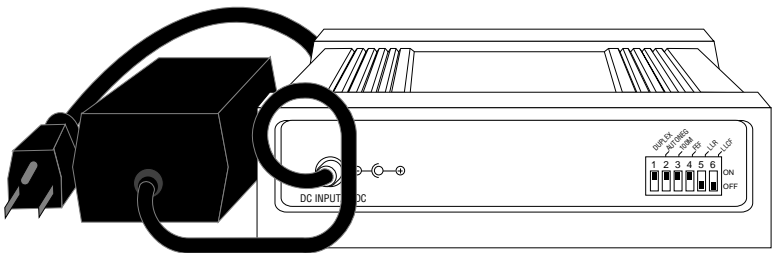
Verify correct segment connectivity via the LK LEDs on the front panel.

If an additional extension cord is used to connect the power module to the power source, the following guidelines must be followed. While one end of the AC power cord can be fitted with whatever plug is standard for the country of operation, the end that connects to the power supply module must have a female plug that fits this type of AC receptacle.

- AC 115V (North American): use a UL-listed and CSA-certified cord set consisting of a minimum No. 18 AWG, type SVT or SJT

three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15A, 125V.

- AC 230V (USA): use a UL-listed cord set consisting of a minimum No. 18 AWG, type SVT three-conductor cord, a maximum of 15 feet in length and a Tandem blade grounding-type attachment plug rated 15A, 250V.

- 240V (outside USA): use a cord set consisting of a minimum No. 18 AWG cord and grounding-type attachment plug rated 15A, 250V. The cord set should have the appropriate safety approvals for the country in which the unit is being installed and be marked HAR.

User Guide

This section contains information about the operating features of the Radiance 10/100Mbps Access Optical Network Unit.

LED Indicators

The Radiance Access Optical Network Unit provides several LEDs on the front panel for the visible verification of unit status and proper functionality. These LEDs can help with troubleshooting and overall network diagnosis and management. There are separate Activity, Link and Disable indicators for each port. Two additional LEDs, labeled 100 and FD, indicate the speed and duplex mode for the copper port. There is also a Loopback indicator for the fiber port.

The following table describes the function of each LED when lit.

LED Label	LED Name	Status	Indication
PWR	Power	Steady	Unit is powered ON.
MAN	Managed	Steady	Unit is receiving management packets.[*]
FD	Full Duplex	Steady	TX port is operating at full duplex. When not lit, TX port is operating at half duplex.
100	100Mbps	Steady	TX port is running at 100Mbps. When not lit, TX port is running at 10Mbps.
ACT	Activity	Blinking	Port is receiving data.
LK	Link	Steady	Port has a valid link.
DIS	Disable	Steady	Port has been disabled by software.
LBK	Loopback	Steady	FX port is in loopback mode.

*NOTE: A management card must be installed in the chassis at the central office to enable remote management.

Factory Settings

The Access ONU provides several configuration options to meet your networking needs. The unit's default settings are listed below.

Default Hardware Switch Settings

MDI-II/MDI-X .... Parallel (UP)

The following switches can be overridden through software commands.
Duplex .... Full Duplex (ON)
Auto-Negotiation .... Enabled (ON)
Speed .... 100Mbps (ON)

Far End Fault .... Enabled (ON)
Link Loss Return .... Disabled (OFF)
Link Loss Carry Forward .... Disabled (OFF)

Default Software Settings
The following settings can only be changed via software commands.[*]
Loopback Mode .... Disabled
Port Enable/Disable ....Enabled

Software Settings
Two operational functions on the Radiance Access Optical Network Unit can be modified only through remote software commands.[*] Remote management communications occur on the fiber optic segment.

Loopback Mode
Loopback is only applicable to the Access ONU's fiber port. Loopback allows the fiber port to return its incoming data back to the sender, while continuing to receive and transmit management packets. The management packets are not looped back to the sender—only the data packets are returned.

When loopback is enabled on the fiber port, its incoming data is transmitted through most of the unit's circuitry, not just the fiber port. This allows most of the circuit to be tested. RMON statistics are incremented on both ports—even though the physical interface on the copper port is neither transmitting nor receiving traffic. During loopback, the LBK LED is lit.

When loopback is enabled, the opposite port is automatically disabled (no link). Loopback is not supported on the Access ONU's copper port, because the fiber port would become disabled, resulting in a loss of control over the unit.

A full power cycle of the Access ONU takes it out of loopback.

Typically, the Access ONU's fiber port is placed in loopback mode to test the segment by using any standard packet-generating test equipment.

Port Enable/Disable
Either port on the Access ONU can be enabled or disabled independently. When a port is disabled, its DIS LED is lit.

---

[*] Refer to the **Command Line Interface Reference Guide**, **NetBeacon Element Management Software Installation & User Guide** or **WebBeacon Management Software Installation & User Guide** for software management information.

Disabling a port stops the data flow to and from that port. Although data is neither sent nor received, the disabled port continues to accept, process and transmit management packets. However, if LLCF is enabled and the opposite port has no link, management packets will not be transmitted.

Remote Management Statistics

Through SNMP management, NetBeacon or WebBeacon, you can view Remote Monitoring (RMON) and Ethernet statistics for the Access ONU.

RMON Statistics

Each port on the Access ONU supports the complete RMON Group 1 statistics outlined in RFC 1757 and listed below.

EtherStatsOctets	EtherStatsPkts
EtherStatsBroadcastPkts	EtherStatsMulticastPkts
EtherStatsCRCAlignErrors	EtherStatsUndersizePkts
EtherStatsFragments	EtherStatsJabbers
EtherStatsCollisions	EtherStatsPkts64Octets
EtherStatsPkts65to127Octets	EtherStatsPkts128to255Octets
EtherStatsPkts256to511Octets	EtherStatsPkts512to1023Octets
EtherStatsPkts1024to1518Octets	EtherStatsOversizePkts
Dropped Events	

Ethernet Statistics

The Ethernet statistics listed in the table below are provided for the Access ONU's fiber port. For the copper port, only the Port Link Status is reported.

Statistic Name	Description
Port Link Status	Indicates whether or not the port has a valid link.
Link Transition Counter	Number of times link was lost since power-up. The value is 0 after the card is reset, even without a link.
Management Counter	Number of management packets received.
Discovery Count	Number of remote devices discovered on the network.

Singlemode Fiber Optic Power Monitors

Through software[*], you can read the input and output power levels of the singlemode fiber optic port on the Access ONU.

Input Power Level

The accuracy of the input power monitor is ±1dBm from -28dBm to -12dBm. The accuracy is ±2dBm from -31dBm to -29dBm. The monitor is unresponsive below -31dBm. If there are no cables connected to the fiber port, the software may display a reading of -40dBm. The Access ONU peaks at -12dBm and reaches saturation at -7dBm.

The singlemode long haul (RA21-17) and extended long haul (RA21-1J) ports are operational down to -34dBm, which is too low for the monitor to measure. If the input power level is between -34dBm and -29dBm, a valid link will be established, however, the light level displayed by the software will show a reading of -40dBm. This reading is not a failure indication; it simply means the level is beyond the range of the power monitor.

Input Power Monitor

Model #	Operational Range	Accurate Monitoring Range	Trap Thresholds	Failure Reading
RA21-14 RA21-16	-29 to -7dBm	-28 to -12dBm	-28dBm and -7dBm	-31dBm
RA21-17 RA21-1J	-34 to -7dBm	-31 to-12dBm	-31dBm and -7dBm	-40dBm

Output Power Level

The accuracy of the output power monitor is ±3dBm. Failure readings indicate that the unit is non-functional and must be replaced. If there are no cables connected to the fiber port, the software may display readings that indicate failure.

Output Power Monitor

| Model #	Operational Range	Typical Reading	Trap Thresholds	Failure Reading
RA21-14 RA21-16	-15 to -8dBm	-11dBm	-15dBm and -7dBm	-18dBm or -3dBm
RA21-17 RA21-1J	-5 to 0dBm	-3dBm	-6dBm and 0dBm	-9dBm or +3dBm

[*] Refer to the *Command Line Interface Reference Guide*, *NetBeacon Element Management Software Installation & 16User Guide* or *WebBeacon Management Software Installation & User Guide* for software management information.

## Link Loss Carry Forward (LLCF)*

The Access Optical Network Unit incorporates Link Loss Carry Forward as an aid in troubleshooting a remote connection. When LLCF is enabled, the ports do not transmit a link signal until they receive a link signal from the opposite port.

Warning: If LLCF is enabled on the Access ONU and its copper port loses link, you will be <u>unable</u> to manage the ONU. Only enable LLCF when notification of a link loss is more important than remote management functionality.

The diagram below shows a typical network configuration with a good link status using a Radiance Access Line Card and an Access ONU for remote connectivity. Note that LLCF is enabled as indicated in the diagram.
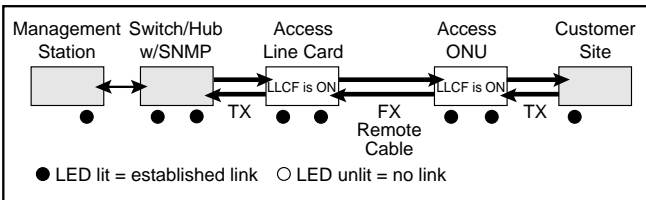
If a connection breaks, as shown below, one or both line cards will carry that link loss forward to the switch/hub which generates a trap to the management station. The administrator can then determine the source of the problem.
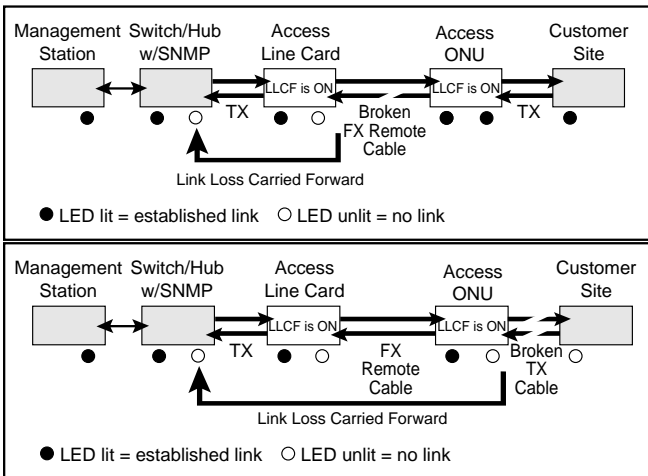
Important: When connecting an Access ONU with LLCF enabled to an auto-negotiating device, force both sides of the configuration to the same duplex and speed. This allows the unit to immediately see link pulses and start passing data.

*The unit is shipped with LLCF disabled (OFF).

Link Loss Return (LLR)

The fiber optic port of the Access ONU has been designed with Link Loss Return functionality[*] for troubleshooting a remote connection.

When LLR is enabled, the fiber port's transmitter shuts down if its receiver fails to detect a valid receive link. LLR should only be enabled on one end of the link and is typically enabled on either the unmanaged or remote device.

The diagram below shows a typical network configuration with a good link status using a Radiance Access Line Card and an Access ONU for remote connectivity.
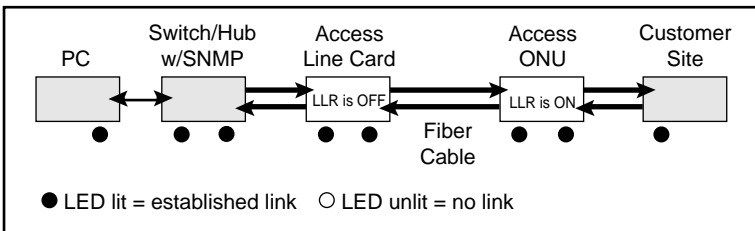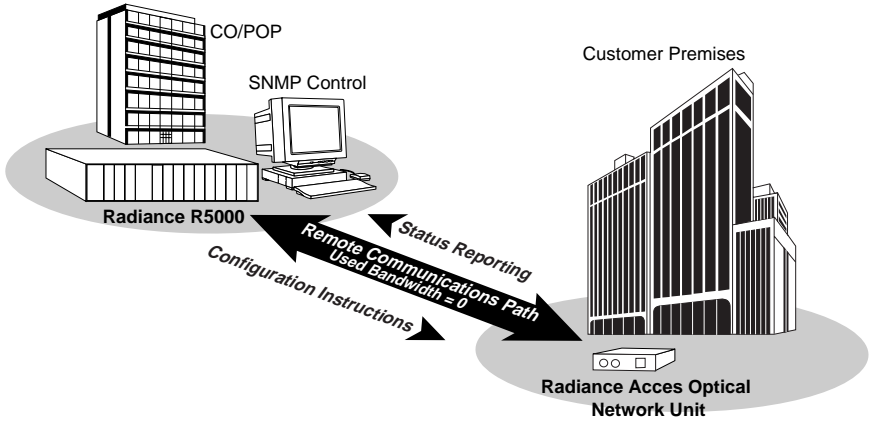

If one of the optical conductors is bad (as shown in the diagram box below), the unit with LLR enabled will return a no link condition to its link partner. This aids the network administrator in determining the source of the loss.
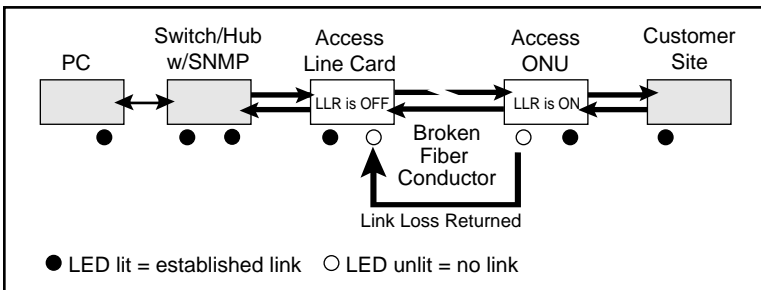
Important: *LLR must not be active on both ends of a configuration. If it is, the link can never be established.*

---

*The unit is shipped with LLR disabled (OFF).

Topology Solutions

CO/POP

SNMP Control

Customer Premises

Radiance R5000

Status Reporting

Remote Communications Path
Used Bandwidth = 0

Configuration Instructions

**Radiance Acces Optical
Network Unit**

Technical Specifications
Data Rate
Data Rate _____ 100Mbps half duplex, 200Mbps full duplex (Fast Ethernet)
_____ 10Mbps half duplex, 20Mbps full duplex (Ethernet)

Network Connections
Twisted-Pair Interface
Connector _____ Shielded RJ-45, 8-pin jack
Impedance _____ 100 Ohms nominal
Signal Level Output (peak differential) _____ 2.2 to 2.8 V (10Mbps)
_____ 0.95 to 1.05 V (100Mbps)
Signal Level Input _____ 585 mV minimum (10Mbps)
_____ 200 mV minimum (100Mbps)
Supported Link Length _____100m
Cable Type _____ Category 3, 4 or 5 UTP/STP (10Mbps)
_____ Category 5 or 5E UTP/STP (100Mbps)

Multimode F/O Interface (RA21-13, RA21-15)
Connector _____ ST or SC
Wavelength _____ 1310 nm
RX Input Sensitivity _____ -31 dBm minimum
Output Power _____ -23.5 dBm to -14 dBm (50/125µm)
_____ -20 dBm to -14 dBm (62.5/125µm)
Supported Link Length _____ up to 2 km full duplex
Cable Type _____ 50/125 or 62.5/125 µm F/O

Singlemode F/O Interface (RA21-14, RA21-16)
Connector _____ ST or SC
Wavelength _____ 1310 nm
RX Input Sensitivity _____ -29 dBm minimum
Output Power _____ -15 dBm to -8 dBm
Supported Link Length _____ up to 20 km full duplex
Cable Type _____ 9/125 µm F/O

Singlemode F/O Interface — long haul distance support (RA21-17)
Connector _____ SC
Wavelength _____ 1310 nm
RX Input Sensitivity _____ -34 dBm minimum
Output Power _____ -5 dBm to 0 dBm
Supported Link Length _____ up to 40 km full duplex
Cable Type _____ 9/125 µm SM F/O

Singlemode F/O Interface — extended long haul distance support (RA21-1J)

Connector _____ SC
Wavelength _____ 1550 nm
RX Input Sensitivity _____ -34 dBm minimum
Output Power _____ -5 dBm to 0 dBm
Supported Link Length _____ up to 100 km full duplex
Cable Type _____ 9/125 µm SM F/O

Singlemode BWDM Fiber Optic Interface (RA21-1X, RA21-1Y)

Connector _____ SC
Supported Link Length _____ up to 20 km full duplex
Cable Type _____ 9/125 µm F/O
RX Input Sensitivity _____ -32 dBm minimum
Output Power _____ -15 dBm to -8 dBm (9/125 µm)
(RA21-1X)
    TX Wavelength _____ 1550 nm
    RX Wavelength _____ 1310 nm
(RA21-1Y)
    TX Wavelength _____ 1310 nm
    RX Wavelength _____ 1550 nm

Power

Input _____ 90-260 V AC, 50/60 Hz
Output _____ 5 V DC @ 2 A, 10 W average

Environmental

Operating Temperature _____ 0˚ to 50˚ C
Storage Temperature _____ -30˚ to 70˚ C
Operating Humidity _____ 5% to 95% non-condensing
Dimensions _____ 4.5" L x 5.75" W x 1.5" H
    _____(11.4 cm x 14.6 cm x 3.8 cm)
Weight _____ 1.26 lb (0.57 kg)

Product Safety, EMC and Compliance Statements

This equipment complies with the following requirements:

- UL
- CSA
- CE
- EN60950 (safety)
- FCC Part 15, Class B
- DOC Class B (emissions)
- EN55022 Class B (emissions)
- EN55024: 1998 (immunity)
- IEC 825-1 Classification
- Class 1 Laser Product

This product shall be handled, stored and disposed of in accordance with all governing and applicable safety and environmental regulatory agency requirements.

The following *FCC* and *Industry Canada* compliance information is applicable to North American customers only.

USA FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canadian Radio Frequency Interference Statement

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Warranty and Servicing
Three-Year Warranty for the Radiance Access Optical Network Unit
Metrobility Optical Systems, Inc. warrants that every Radiance Access Optical Unit will be free from defects in material and workmanship for a period of THREE YEARS from the date of Metrobility shipment. This warranty covers the original user only and is not transferable. Should the unit fail at any time during this warranty period, Metrobility will, at its sole discretion, replace, repair, or refund the purchase price of the product. This warranty is limited to defects in workmanship and materials and does not cover damage from accident, acts of God, neglect, contamination, misuse or abnormal conditions of operation or handling, including overvoltage failures caused by use outside of the product's specified rating, or normal wear and tear of mechanical components.

To establish original ownership and provide date of purchase, complete and return the registration card or register the product online at www.metrobility.com. If product was not purchased directly from Metrobility, please provide source, invoice number and date of purchase.

To return a defective product for warranty coverage, contact Metrobility Customer Service for a return materials authorization (RMA) number. Send the defective product postage and insurance prepaid to the address provided to you by the Metrobility Technical Support Representative. Failure to properly protect the product during shipping may void this warranty. The Metrobility RMA number must be clearly on the outside of the carton to ensure its acceptance.

Metrobility will pay return transportation for product repaired or replaced in-warranty. Before making any repair not covered by the warranty, Metrobility will estimate cost and obtain authorization, then invoice for repair and return transportation. Metrobility reserves the right to charge for all testing and shipping costs incurred, if test results determine that the unit is without defect.

This warranty constitutes the buyer's sole remedy. No other warranties, such as fitness for a particular purpose, are expressed or implied. Under no circumstances will Metrobility be liable for any damages incurred by the use of this product including, but not limited to, lost profits, lost savings, and incidental or consequential damages arising from the use of, or inability to use, this product. Authorized resellers are not authorized to extend any other warranty on Metrobility's behalf.
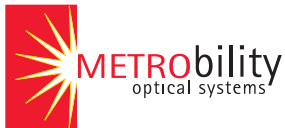
Product Manuals

The most recent version of this manual is available online at
http://www.metrobility.com/support/manuals.htm

To obtain additional copies of this manual, contact your reseller, or call
1.877.526.2278 or 1.603.880.1833

Product Registration

To register your product, go to
http://www.metrobility.com/support/registration.asp

25 Manchester Street, Merrimack, NH 03054 USA
tel: 1.603.880.1833 • fax: 1.603.594.2887
www.metrobility.com